

ENVIRONMENTAL PROTECTION AGENCY (EPA)
2021 TARGETED AIRSHED GRANT PROGRAM
EPA-OAR-OAQPS-21-03
WORKPLAN

Project Title: Long Range Class 8 Fuel Cell Truck Demonstration and Low-Emissions School Bus Replacement Project

Applicant Information: South Coast Air Quality Management District
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Budget Summary and Project Period

Project Title	EPA Funding Requested	Voluntary Cost Share	Other Leveraged Funds	Total Project Cost
Long Range Class 8 Fuel Cell Truck Demonstration	\$3,608,012	\$468,785	\$3,202,336	\$7,279,133
Low-Emissions School Bus Replacement Project	\$4,390,012	\$8,562,150		\$12,952,162
Total	\$7,998,024	\$9,030,935	\$3,202,336	\$20,231,295

Project Period: Project 1. Long Range Class 8 Fuel Cell Truck Demonstration: 1/01/2022 – 12/31/2024
Project 2. Low-Emissions School Bus Replacement Project: 12/01/2021 – 7/31/2023

Project Description: **Project 1. Long Range Class 8 Fuel Cell Truck Demonstration:** Hyundai Motor Company (HMC) will demonstrate five day-cab tractors with their fleet partner and their commercial operations in existing goods movement routes to validate fuel cell technology's ability to meet the real-world needs of long-haul freight movement in the United States. The trucks will be demonstrated for 12 months in a variety of routes to utilize the up to 500-mile range. This deployment will allow the project team to gain valuable insight through real world operations in a range of driving conditions
Project 2. Low-Emissions School Bus Replacement Project: Replace up to 38 MY 2007 and older diesel school buses with MY 2021 and newer zero emission battery electric school buses certified to meet the California Air Resources Board's (CARB) standards.

Project Location: This project will benefit the disadvantaged communities in the SCAB (South coast Air Basin) and are recognized as the most polluted area for ozone by the U.S. Environmental Protection Agency (EPA).

PROJECT NARRATIVE

Project 1: Long Range Class 8 Fuel Cell Truck Demonstration

Section 1 Project Summary/Approach

(a) Detailed Project Summary



Hyundai Motor Company (HMC) will demonstrate five 6x4 day-cab Class 8 XCIENT fuel cell electric tractors (FCETs) in partnership with First Element Fuel Inc. (FEF) who will both operate the fleet of trucks to support their hydrogen fuel delivery logistics and serve as the hydrogen refueling station provider for the fleet. FEF will deploy five in their ongoing commercial operations to distribute hydrogen fuel to 10 of their public hydrogen refueling stations and a Logistics Hub, thereby validating the ability of fuel cell technology to meet the real-world needs of long-haul freight movement in the United States. The trucks will be demonstrated for 12 months in a variety of routes to fully utilize up to 500-miles of zero emission driving range. The average daily driving range per truck is expected to be at minimum 360 miles or 108,000 miles per year. This deployment will provide the project participants with valuable insight through real world operations in a range of driving conditions.

HMC has assembled a project team with FEF alongside SCAQMD as the project lead, representing the interests of the public and private sectors at large. This project leverages decades of experience and previous investments in hydrogen fuel cell & hydrogen refueling technology. With this inclusive coalition of industry and public sector organizations, the project team will be able to successfully support a one-year demonstration plus four years of continued

field operation of Class 8 fuel cell tractors. These state-of-the-art vehicles with up to 500-mile range are designed to satisfy the needs of regional and long-haul goods movement in the United States.

FEF has committed to demonstrate the proposed vehicles for bulk gaseous and liquid hydrogen supply runs for their ongoing hydrogen refueling stations (HRS) operations in California (primarily in the South Coast Air Basin) for a 12-month period plus an additional four years of commercial operation. The trucks will operate out of a local hydrogen terminal in Ontario, CA and will move fuel to FEF's public retail HRS located in Costa Mesa, La Cañada Flintridge, Long Beach, Lake Forest, Playa Del Rey, Hollywood Blvd., Del Mar, South Pasadena, Thousand Oaks and Santa Barbara. A long-haul daily trip out of the South Coast Air Basin to FEF's northern California hub in Livermore is planned as well (a 377 mi one-way trip), with the truck returning on the next day — this would demonstrate the longest zero emission heavy duty freight corridor by today's standards. Furthermore, FEF is in the process of developing a California network of hydrogen refueling stations for Heavy Duty Fuel Cell Truck Refueling, so that they will be in position to refuel all Hyundai XCIENT FCETs that they are intending to operate.

HMC will provide a comprehensive bumper-to-bumper warranty over the course of the 5-year project to remove fleet customer anxiety towards this new technology. Regional truck service & maintenance is going to be covered by a local partner that will also provide a 24h towing service in case of vehicle breakdown or emergency.

HMC is a multinational vehicle manufacturer with a presence in 193 countries, employing more than 75,000 people worldwide. HMC has been developing fuel cell technology for more than 25 years and is driving the boundaries of zero-emission transportation with hydrogen fuel cells in heavy-duty, as well as light-duty, transit, off-road and other applications. Globally, HMC is the only OEM offering a serial produced Class 8 fuel cell truck for commercial operation to fleets, with approximately 50 trucks deployed in commercial service in Switzerland. An additional 140 vehicles will be deployed in 2021 with the goal to put 1,600 trucks into service by 2025.

HMC has a research and development campus dedicated to hydrogen fuel cell technology in the city of Mabuk, South Korea. HMC's FCEV Vision 2030 plan includes \$6.7 billion in investments to increase its annual global fuel cell manufacturing capacity to 700,000 fuel cell systems per year. The company is a demonstrated leader in the industry; it is one of the 13 founding members of the Hydrogen Council — a global coalition of leading energy, transport, and industry companies with a united long-term vision to foster the transition to hydrogen. Nationally, HMC has a strong presence in the industry and market in the United States and in California. HMC has participated in multiple demonstration projects sponsored by the U.S. Department of Energy to promote the development and use of hydrogen vehicle technologies. HMC was the first OEM to introduce light-duty fuel cell vehicles in the Californian retail market in 2014 with the Hyundai Tucson Fuel Cell (which was the first serial produced fuel cell vehicle worldwide), followed by the second-generation light-duty fuel cell SUV, the Nexo, in 2018. It is important to note these were the first commercially leased customer operated fuel cell vehicles (prior deployments of other light-duty fuel cell vehicles were part of demonstrations of noncommercially available products). HMC is also a founding member of the California Fuel Cell partnership (CAFCP), and one of the Project team members, Jerome Gregeois, is the current chairman of CAFCP.

The European version of the XCIENT fuel cell truck has already been sold commercially in Switzerland with 50 of these trucks deployed in service in 2020 and 140 will be delivered in 2021. By 2025 it is expected a total of 1,600 units will be in service. Trucks currently in service are pulling excess of 80,000 lbs. of GVW over Swiss mountain passes, with excellent performance results, as evidenced by driver satisfaction and expanded orders from transport companies. As of June 7, 2021, XCIENT Fuel Cell trucks logged over 513,000 miles in commercial service, avoiding an accumulated 645 tons of CO₂ emissions.

Table 1: Detailed specification of the vehicle proposed in the project

Technical Specification	European XCIENT 4x2 Cargo	Proposed XCIENT 6x4 Tractor
Fuel Cell (FC) System	2 Fuel Cell Power Units (Stack+BOP) for 190 kW gross power output	2 Fuel Cell Power Units (Stack+BOP) for 180 kW gross power output
Station Nozzle	H35, manufacturer depending on station	H70
Vehicle Range	250 miles (confirmed)	Up to 500 miles (target)
Onboard H₂ Storage	32 kg	70 kg
H₂ tank Pressure	350 bar (5,000 psi) (truck & HRS)	700 bar (10,000 psi) (truck & HRS)
Motor	Single, centrally mounted motor	Single, centrally mounted motor
Motor Output	350 kW peak (max.)	350 kW peak at 613 V (limited, actual peak is 438 kW) 295 kW continuous power
Transmission	US-made Allison 6-speed ATM	US-made Allison 6-speed ATM
Battery	1 battery pack (consisting of 3 modules) for 73 kWh of energy	1 battery pack (consisting of 3 modules) for 73 kWh of energy
Truck Length & Wheelbase	OAL 384", wheelbase 202"	OAL of tractor ~343" + max. 53' trailer; 197" wheelbase



FEF's project team has more experience and expertise than any team in the world in designing, planning, constructing, testing, operating, and maintaining hydrogen refueling stations (HRS). The company currently operates 28 retail HRS in California and has 54 additional HRS under various phases of development, including 6 stations for hydrogen refueling of heavy-duty trucks. Today FEF performs over 1100 hydrogen vehicle fills daily, and retails nearly 3000 kilograms of hydrogen per day making it the largest on-road hydrogen vehicle refueling company in the world. To date, FEF has performed more than 770,000 successful hydrogen vehicle fills, dispensed more than 2.5 Million kilograms of hydrogen and avoided 97.5 Million

pounds of CO₂ as a result of selling hydrogen that is 100% renewable and net zero carbon. FEF is the only company in the world that is purpose-built and entirely dedicated to these functions. The individuals that make up FEF's core team have either built, commissioned and/or serviced the majority of every open hydrogen station in the State of California and have more than 75 years combined experience in functions dedicated to developing and operating hydrogen fueling stations.

FEF has 6 HRS under development that will be capable of refueling Class 8 Heavy Duty Fuel Cell Trucks. All six stations will be capable and available for refueling the five (5) Hyundai XCIENT FCETs, but the trucks will primarily use FEF's Heavy Duty Fuel Cell Truck HRS located in the Riverside region, and in the Livermore region. Each of FEF's Heavy Duty Fuel Cell Truck HRS will have a minimum daily capacity of 1600 kilograms per day, with multi-fueling position, high-flow 70 MPA refueling capability. Each HRS will use special purpose "high-flow" nozzle and dispenser products developed by Tatsuno in conjunction with the multi-national OEM and fueling committee. Cryogenic pump systems will provide sufficient pressurization for full, simultaneous H70-T40 heavy duty filling.

Organization will Retain Vehicle Ownership

After the demonstration period of 12 months, FEF will retain the vehicles for a continued 4-year commercial operation with the option for extension. Furthermore, HMC is working with an already identified external partner to develop and provide a leasing option to offer the replacement of the proposed vehicles with new units after a certain timespan. Implementation of a leasing option will help explore and facilitate the business case for customers of class 8 fuel cell trucks and accelerate the technology's commercial readiness.

(b) Emissions Inventory

According to the 2020 CARB Mobile Source Strategy (MSS) and 2016 State Implementation Plan (SIP), heavy-duty trucks stills makes up nearly 1/3 of mobile source NOx emissions and account for 20% of Ozone precursors and PM2.5. At the same time, even with all state and federal regulations, additional NOx reductions will be needed to reach attainment with limited reductions for 2023 and 2031. The proposed project with a quantity of up to 5 class 8 zero-emission Fuel cell trucks is estimated to reduce annually 1.33 tpy of PM2.5, 33.34 tpy of NOx and 734 tpy of CO emissions. Achieving immediate and on-going improvements in air quality and public health, particularly in communities where the residents are disproportionately impacted by the adverse effects of high levels of emissions, the proposed project will allow an increased volume of replacements to EJ communities.

The longer-term goal of this project is to promote market acceptance, professional jobs related to manufacturing of vehicles, along with associated business management functions such as marketing, program management, and financial and supply chain management. South Coast AQMD is in a nonattainment area for air quality, with residents facing a disproportionate burden of harmful emissions such as NOx, volatile organic compounds (VOCs), and PM 2.5. Long term exposure to these pollutants and air toxins is known to cause harmful health effects, particularly to sensitive populations. Table 1 below lists the key air pollutant inventories, based on CARB 2016 State Implementation Plan (SIP) Emission Projection Data for heavy-duty trucks in the South Coast Air Basin. Emissions from these listed categories account for 20% of ozone precursors and PM 2.5 in the South Coast Air Basin¹.

Table 1: 2020 SIP Emission Projection Data (CARB) tons/day

Category	VOC	NOX	PM2.5	CO
LIGHT HEAVY-DUTY GAS TRUCKS – 1	3.44	4.28	0.12	13.67
LIGHT HEAVY-DUTY DIESEL TRUCKS - 1 (LHDDT1)	0.30	8.81	0.18	2.02
MEDIUM HEAVY-DUTY DIESEL TRUCKS (MHDDT)	0.57	16.01	0.76	2.02
HEAVY HEAVY-DUTY DIESEL TRUCKS (HHDDT)	1.50	55.51	0.63	8.66

This project will help address emissions from numerous relevant source categories. Table 2 below lists control measures from the 2016 South Coast Air Quality Mitigation Plan (AQMP) which will be affected by the deployment of battery electric trucks as part of this project. In addition to the immediate emission reductions and community engagement effects of this deployment, this project is poised to serve as a catalyst for the accelerated penetration of zero emission technologies throughout the South Coast Air Basin. Through its Clean Fuels Fund, South Coast AQMD supports a variety of zero and near-zero emission technologies as part of its portfolio approach to achieve the required 45% and 55% additional NOx reductions to reach attainment of its national ambient air quality standards (NAAQS). As part of a longer term strategy, South Coast AQMD partners with major OEMs such as Volvo to accelerate commercial deployment of the most promising zero emission technologies in source categories that have the greatest potential to achieve significant NOx and PM 2.5 reductions, as well as greenhouse gas (GHG) co-benefits. Heavy-duty battery electric trucks are important components of this strategy.

Table 2: 2016 South Coast AQMD AQMP Air Quality Attainment Measures

AQMP Measure	Project Relationship
MOB-03: Emission Reductions at Warehouse Distribution Centers	Replacement of older diesel distribution trucks with new Class 8 battery electric trucks will result in NOx and PM 2.5 emission reductions from displaced diesel vehicles at DHE, NFI, and other distribution centers in the South Coast Air Basin, particularly in the DACs of Chino, Ontario, Riverside, and Van Nuys.
MOB-05: Accelerated Penetration of Partial Zero-Emission and Zero Emission Vehicles	This project will add to the deployment of zero emission freight handling and goods movement at DACs in the South Coast Air Basin. It will serve as a proving ground for Class 8 battery electric trucks in distribution, short haul, and drayage applications. In addition, the project partners are best positioned to push the market forward by leveraging existing connections and serving as model fleet sites in zero emission freight handling applications.
MOB-07: Accelerated Penetration of Partial Zero-Emission and Zero Emission Light-heavy and Medium-heavy-duty vehicles	Commercial deployment of the production level Volvo electric VNR truck platform to the market will increase options for fleets facing compliance deadlines for upcoming CARB regulations and are in the market for new vehicles to begin meeting regulatory deadlines starting in model year 2024. Without a well-planned, high-visibility deployment by a major worldwide OEM, fleets are hesitant to trust new technologies for heavy-duty trucks. This project will validate the technology on a wider scale so that fleets may confidently make the switch to zero emission technologies and facilitate a price drop with increased adoption.
MOB-08: Accelerated Retirement of Older On-Road Heavy-duty Vehicles	With a viable zero emission truck on the market, fleets will be encouraged to retire their older diesel trucks. Fleets waiting for a commercially available zero emission Class 8 truck option will now have access to these trucks. Certification of these trucks through the CARB zero emission powertrain certification process and qualification for incentive funding such as HVIP, VW Settlement, Carl Moyer, and Prop 1B will reduce the price differential to fleets and make zero emission trucks more

¹ <https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/appendix-iii.pdf?sfvrsn=6>

	affordable. Outreach on the benefits of these technologies to residents and businesses in DACs will increase technology visibility and promote more sustainable policies for local governments in DACs where these freight handling and logistics facilities are frequently domiciled.
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(c) Consideration of Activities

The 2016 South Coast AQMD's Air Quality Management Plan (AQMP or Plan) identified Class 4-8 on-road heavy-duty trucks as significant sources of mobile source NOx inventory in this region. As such, South Coast AQMD has placed significant importance on accelerating vehicle turnover by replacing older captive fleets with zero- and near-zero-emission vehicles. The considerable public and private investments and technical expertise from major original equipment manufacturers (OEMs) such as DTNA, Volvo, and others has resulted in commercially available on-road heavy-duty battery-electric platforms that meet the performance and duty cycles of local food transportation and distribution. Captive, anchored heavy-duty vehicles and fleets are prime candidates for zero-emission technology, contribute significantly to reducing emissions from the cleanest internal combustion engine and their use is consistent with the direction and objectives that CARB has prescribed for California anchored vehicles and fleets. The proposed use of zero-emission vehicles under this project is also providing a demonstration of this technology to this sector of the economy that has expressed their intent to transition from diesel to all electric.

Among these strategies, the second and third strategies – replacement with hybrid-electric standby and all-electric refrigerated trailers supported with electrified parking spot infrastructure - fit into South Coast AQMD air quality goals and also with potential fleet operators because it facilitates turnover of older and dirtier heavy-duty vehicles to near zero-emission and zero-emission technologies and ensures that air quality benefits are not further delayed while allowing food distribution companies to maintain existing operations with minimal changes for personnel and route alterations. Most importantly, this strategy provides certainty for emissions reductions to be permanent in the fleet's operations throughout the life of the assets and the emission reduction investment by EPA. The proposed zero-emission option will achieve the maximum emissions reductions in the South Coast AQMD and eliminate NOx, DPM, HC, CO, and GHG emissions from diesel refrigerated trailers.

Mobile sources make up the largest portion of NOx and PM2.5 emissions and have been identified as the most significant sources with adverse impact on air quality and public health, particularly in EJ communities in the SCAB. The day to day operations and activities in these communities result in high levels of emissions of ozone precursors, toxic air contaminants and greenhouse gases. In order to mitigate these emissions, SCAQMD strongly supports numerous pathways to accelerated deployment of zero and near-zero emission technologies. Zero-emission fuel cell trucks are one of many ways to achieve a Zero-emission technologies Roadmap.

In an economy that is experiencing accelerated growth in on-road freight movement, Fuel cell electric trucks are a critical technology for achieving United States' energy, environmental, and transportation policy goals. No other existing zero-emission propulsion technology offers diesel truck operators the same one-to-one replacement utility for demanding freight movement applications.

Hydrogen Fuel-cell technology is a particularly attractive solution for heavy duty goods movement because of hydrogen's high gravimetric energy storage density and capability of supporting fast refueling times, enabling longer range and higher vehicle utilization. At scale, Fuel-cell infrastructure cost are considerably lower compared to battery electric solutions since HRS will not be largely depending on electric grid capacity and have a much smaller footprint compared to the many electric chargers that will be necessary to support larger battery electric fleets with longer dwell times. Fuel-cell technology shares the same advantages of battery electric trucks — zero-emission operation, high-efficiency electric powertrains, and overall low noise & vibrations in operation – while offering additional advantages of fast refueling, considerably longer driving range, very little range degradation in cold weather environment and superior payload performance.

Moving freight is a business and any time a truck is spending refueling or recharging is equivalent to a loss in revenue for the operator. Additionally, accessory loads such as heating and air conditioning (HVAC), driver information systems, and more can be met using the powertrain's own fuel cell power output, eliminating the need for auxiliary power generation, which is another significant source of emissions. The hundreds of thousands of trucks that sustain the Californian economy generate more than 9% of the state's greenhouse gas emissions, 32% of its nitrogen oxides, and 3% of its particulate emissions. The proposed 5 XCIENT FCE 6x4 tractors will provide an important contribution for GHG reduction and cleaner air in communities that are known to suffer under bad air quality for decades.

Compared to a baseline Diesel truck with 5 miles/diesel gallon fuel efficiency and an average daily driving range of 167 miles on 300 days per year, it is expected that the 5 XCIENT fuel cell tractors will avoid a combined 734 metric tons of CO₂ emissions annually.

d) Progress Towards Attainment

Detailed inventory analysis as well as emission reduction calculations can be found in attachment 3 and 5. For this project

Table 4. Emission reduction

Emission Reduction Impact	Total Annual Emission Reduction Over 1 Year	Total Reduction Over the Life of the Project (10 years)
CO2 (Metric Tons)	256.4	2,563.9
NOx (Metric Tons)	0.242	2.417
Particle Matter (Metric Tons)	0.006	0.057

* Assuming 50,000 annual miles per truck

On a quarterly basis, SCAQMD will report to EPA the project status, including milestones such as number of shuttle buses delivered and EVSEs installed, any challenges and delays encountered, updated timeline, if necessary, funds expended, and other pertinent information.

(e) Roles and Responsibilities

Role of Hyundai South Coast AQMD

The SCAQMD staff will implement the proposed incentive program, monitor progress and submit quarterly reports to EPA on progress and findings of this project. Quarterly reports will contain accomplishments, description of any slippages and challenges, and other pertinent information. The SCAQMD will also submit to EPA a final performance report, within 30 days following the expiration of the grant project period. The report shall be submitted to the EPA Project Officer and may be submitted electronically. The report shall contain the same information as in the quarterly reports but will cover the entire project period. SCAQMD will work with HMC to ensure the development and demonstration of 5 Class 8 fuel cell trucks.

Role of Hyundai Motor Company

HMC will develop, build and deliver 5 of its XCIENT fuel cell electric Class 8 6x4 tractors for deployment into FEF's H2 delivery operations. HMC will work with an external maintenance partner to provide preventive truck maintenance and service as well as 24 hours towing. Hyundai will provide training on truck service and maintenance to technicians via a train-the-trainers program. Hyundai has provided this training previously as part of its fuel cell truck deployment in Switzerland. The Project Team intends to leverage that experience in developing and delivering the appropriate training.

Hyundai will ensure that the trucks are fully homologated in accordance to all legal requirements of the US Department of Transportation (DOT), the National Highway Traffic Safety Administration (NHTSA), the US Environmental Protection Agency (EPA), and CARB. The Hyundai America Technical Center in Ann Arbor, Michigan has over 30 years of experience certifying and homologating passenger and commercial vehicles with EPA, NHTSA, and CARB.

Furthermore, HMC will also provide a 5-year bumper-to-bumper warranty including all chassis and electrical components (fuel cell systems, high voltage battery, e-motor, power electronics).

HMC will provide comprehensive on- and offline training to FEF's drivers in order to familiarize them with vehicle operation, hydrogen refueling and emergency procedures like shutdown of high voltage components.

Role of FirstElement Fuel Inc.

FEF will purchase five (5) HMC XCIENT fuel cell electric 6x4 tractors and will operate them in its fleet operation. FEF will utilize the vehicles to haul both liquid and gaseous hydrogen from a hydrogen terminal in Ontario, CA to hydrogen refueling stations throughout the South Coast Air Basin, and along a long-haul (377 miles each way) route to their Hydrogen Hub in Livermore, CA. Bulk hydrogen deliveries to each station will range from 1-2 deliveries per day, and the long-haul delivery to Livermore will happen once every two days with a return trip made in between deliveries (i.e., the tractor to Livermore will travel 377 miles each day).

FEF will also provide the HRS infrastructure to support refueling of the 5 Hyundai XCIENT FCE trucks. The hydrogen refueling station capacity will be at least 1600 kg/day, which supports up to 32 trucks with an average fill of 50 kg. The five (5) trucks proposed for this program will consume an expected daily volume ranging from 200 to 300 kg of hydrogen. It will take less than 15 minutes to complete a maximum fill of up to 60 kg of hydrogen (an average fill is anticipated to be 50 kg of hydrogen).

(2) Environmental Justice

2-A) Environmental Justice Issues and Environmental Health Disparities

EJ communities (EJCs) have long been a focus of the South Coast AQMD. In 1990, the South Coast AQMD formed an Ethnic Community Advisory Group that was restructured as the Environmental Justice Advisory Group (EJAG). EJAG's mission is to advise and assist South Coast AQMD in protecting public health in South Coast AQMD's most impacted communities through the reduction and prevention of air pollution. The SCAB contains numerous communities experiencing disproportionate environmental impacts, including the Port communities that will directly benefit from the operation of proposed zero-emission (ZE) technology. The purpose of South Coast AQMD's EJ program is to

ensure that everyone has the right to equal protection from air pollution and fair access to the decision-making process that works to improve the quality of air within their communities. The project includes facilities from the confirmed fleet partners that are domiciled or operated in EJC's. According to CalEPA's CalEnviroScreen (CES) 3.0 mapping tool, the location of the fleet bases in SCAB are all located in EJC's that rank higher than 90th percentile in terms of pollution burden. This tool aggregates pollution and population data to score community burdens. Note that all the fleets operate in the surrounding regions which include many EJC's and the vehicles that travel from the site operate heavily in EJC's. EJC's near this project will benefit from the immediate reductions in diesel emissions, increased community engagement with local businesses and residents, and the long-term benefits of ZE technologies.

Table 5: Project Facility Location in DAC

Fleet	Address	DAC	CES 3.0 Pollution Burden %ile	EJSCREEN PM2.5 %ile	EJSCREEN Ozone %ile	EJSCREEN Demographic Index %ile	EJSCREEN Minority Population %ile
FirstElement Fuel	5735 E Airport Dr. Ontario, CA 91761	Yes	98	99	99	94	98

Gaseous Hydrogen Supply

<u>Station Name</u>	<u>Region</u>	<u>Distance</u>
Costa Mesa	South	47.8
La Cañada Flintridge	South	45.5
Long Beach	South	52.7
Lake Forest	South	42.4
Playa Del Rey	South	59.2
Hollywood Blvd.	South	48.7
Del Mar	South	101.0
South Pasadena	South	40.3
Thousand Oaks	South	82.3
Santa Barbara	South	141.0

Liquid Hydrogen Supply

<u>Station Name</u>	<u>Region</u>	<u>Distance</u>
Livermore Hub	na	377

(2-B) Community Engagement

The desired outcome of community engagement and partnerships is twofold. First, to have meaningful interactions with local businesses, organizations, and residents in the surrounding DACs, and second, to garner support of major fleets who will help accelerate adoption of battery electric trucks in California and throughout the U.S. Fleets must understand that heavy-duty battery electric trucks are reliable and will not reduce their productivity, and policymakers must understand how to overcome obstacles to catalyze penetration of heavy-duty battery electric trucks in the marketplace. This project will enable both outcomes.

South Coast AQMD and HMC will utilize several existing channels to engage communities. Reach Out, a local community-based organization, has been engaged to serve as the partner tasked with helping local stakeholders understand the economic and environmental benefits of the project for their future. Other outreach opportunities for this project include annual events such as the Riverside AltCar in October, Advanced Clean Transportation (ACT) Expo in May, and Drive Electric Week in September. Community engagement is not part of the federal budget request for this project and will be completely funded through leveraged sources. The wide cross-section of California, national and international events provide the greatest opportunity for reaching fleet managers, planners, management, drivers and thought leaders needed to advance the heavy-duty fuel cell electric market.

There are also community meetings and implementation activities from South Coast AQMD's implementation of the AB 617 program for the San Bernardino/Muscoy community, which also benefit the surrounding communities of Ontario, Chino, and Fontana in San Bernardino County, and Riverside in Riverside County. Many of the community meetings for the AB 617 program focus on communicating the benefits and challenges with implementing zero emission technologies in freight handling facilities in and around San Bernardino. Although residents in these DACs have pressed for using Community Air protection (CAP) funding for only zero emission trucks driving to/from freight handling facilities in their communities, residents are beginning to have a greater understanding that without the commercial availability of viable Class 8 zero emission trucks and OEMs capable of supporting these trucks during their infancy, deploying significant numbers of zero emission trucks is not feasible. Supporting the early commercialization of HMC's Class 8 fuel cell trucks will enable viable Class 8 fuel cell trucks to penetrate the market more quickly and for residents to see greater numbers of these trucks in their communities as early as 2023.

3. Environmental Results – Outcomes, Outputs and Performance Measures (A & B) Expected Project Outcomes and Emission Reductions

With the objective of maximizing emission reductions, the project will prioritize the electrification of existing diesel local freight trucks operating in the South Coast Air Basin. Fuel cell trucks are the greatest emission reduction alternative to conventional diesel trucks, and South Coast AQMD is targeting deployments in DACs disproportionately affected by pollution related to goods movement. The underlying data (mileage, turn-in vehicle age, remaining useful life, etc.) used to calculate the emission reductions are available in the emission calculation attachment, and the tool used was the EPA's Diesel Emissions Quantifier² (DEQ). The DEQ utilizes emission factors from MOVES2014, and the MOVES2014 emission factors are included in the attachment as well.

Table 6. Emission reduction

Emission Reduction Impact	Total Annual Emission Reduction Over 1 Year	Total Reduction Over the Life of the Project (10 years)
CO2 (Metric Tons)	256.4	2,563.9
NOx (Metric Tons)	0.242	2.417
Particle Matter (Metric Tons)	0.006	0.057

- **Catalyzed Commercialization through Large-Scale Deployments:** HMC has a strong commitment to transportation electrification and has developed a commercialization plan with regional distribution, drayage and refuse applications as prime targets for transportation electrification. These applications represent the lower speeds and fuel economies likely to benefit most from electrification. The business case analysis investigated the factors influencing the purchase of battery electric vehicles and includes policy, cost, performance, and customer preferences. Coupled with Volvo's experience in providing a sustainable TCO for the vehicle, a successful electric truck platform for the U.S. market will be further solidified.
- **Acceleration of Widespread Adoption:** This project will result in not only additional vehicle deployments but vehicles in revenue service—truly displacing diesel trucks in operation. This is a critical step in the acceleration of the transportation electrification effort and a huge step for emission reductions. When the marketing and communications about this effort move forward, fleets will learn that these are real trucks that can be relied on for fleet operations. This will be a gamechanger for future goods movement in California and the U.S.

(c) Performance Measures and Plans

South Coast AQMD utilizes the Multiple Air Toxics Exposure Study V (MATES V) to monitor and evaluate emissions in the South Coast Air Basin. South Coast AQMD gathers measurements for carbon dioxide (CO2), nitrogen dioxide (NO2), ozone, PM 10, and PM 2.5: background level, pollutant transport, population exposure, representative concentration, source impact, real time modeling and trend analyses. South Coast AQMD produces reports based upon MATES V data and will continue to update these findings throughout the project period. Through its data collection partner, Energetics, Volvo, and its participating fleets will provide EPA with operational data to vehicle performance, energy use, mechanical issues, operational costs, and driver impressions of the fuel cell trucks.

(d) Timelines and Milestones

Milestone	2022				2022				2023				2024
	Q1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	
Task 1: Grant Agreement & Outreach													
1.1 EPA Award Notification													
Task 2: Contracts Execution													
2.1 Board Approval													
2.2 Contract Execution													
2.3 Contractors to execute subcontracts with third parties													
Task 3: Development of fuel cell trucks													
Task 4: Delivery and Demonstration													

² <https://cfpub.epa.gov/quantifier/index.cfm?action=main.home>

Task 5: Monitoring and Reporting													
5.1 Quarterly Reports													
5.2 Air Quality Benefit Analysis													
5.3 Final Report													

4. Programmatic Capability and Past Performance

(A & B) Past Performance and Reporting Requirements

During the last ten years, South Coast AQMD has been the prime applicant for dozens of successful, federally co-funded emission reduction projects. The organization's subject matter expertise and project management capabilities ensure that deliverables are completed successfully, and that reporting is complete and timely. Three recent and relevant federally funded projects are in Table below.

South Coast AQMD is the air pollution control agency responsible for monitoring and regulating air pollution in the South Coast Air Basin and the Riverside County portion of the Salton Sea Air Basin (SSAB) and Mojave Desert Air Basin (MDAB). The Basin comprises Orange County and non-desert portions of Los Angeles, Riverside, and San Bernardino counties. South Coast AQMD jurisdiction is the second most populous urban area in the U.S. and covers approximately 11,000 square miles with approximately 17 million residents. These areas include the first and fourth top polluted areas for ozone and the number two ranked top polluted area for PM 2.5. South Coast AQMD is also responsible for the development and implementation of the Basin's AQMP for the inclusion in the state implementation plan (SIP) to attain and maintain the NAAQS for ozone and PM 2.5. The topography and climate of southern California combined with the growing population, increase in goods movement, San Pedro Bay Ports activities, and manufacturing, chemical, and refining industries make the Basin an area of high air pollution. Densely populated areas near intermodal facilities, the Ports, and certain industrial areas, have created several environmental justice areas.

Table 7: List of Federally funded assistance agreements similar in size, scope, and relevance

Title / EPA Agreement No.	Description	CFDA	Status	Reporting
Shuttle Bus Replacement (EM-99T71501)	The agreement (\$3.2 million) is to replace conventional diesel and gasoline powered shuttle buses with zero emission shuttle buses in Southern California airports	66.202	On-going	Progress reports submitted on a quarterly basis
Daimler Develop Heavy-Duty Trucks with EV Infrastructure (A00909418)	The agreement (\$500,000) is to develop 20 heavy-duty battery electric trucks with EV infrastructure and energy storage to demonstrate real-world fleet operations in DACs	66.001	On-going	Progress reports submitted on a quarterly basis

South Coast AQMD has a long history of successfully collaborating with Basin stakeholders to reduce emissions from a variety of mobile sources and stationary sources. South Coast AQMD is successfully implementing several air quality incentive programs including the VW Settlement, Proposition 1B, Carl Moyer Program, and Lower Emitting School Bus Program. Through the Carl Moyer Program, South Coast AQMD has generated 7,954 tons per year of NOx, 294 tons per year of ROG, and 232 tons per year of PM in the South Coast Air Basin, through the allocation of \$390 million in State funding. For the Proposition 1B, which entail more than \$458 million in State funding, South Coast AQMD spearheaded the deployment of over 6,595 zero and near-zero emission trucks, 25 ships at berth, three pieces of cargo handling equipment, and 20 locomotives, resulting in 42,798 tons of NOx and 1,154.5 tons of PM 2.5 in the South Coast Air Basin³ for Years 1-5. In addition, under the Clean Fuels Program established in 1988, the South Coast AQMD successfully leveraged \$321 million in Clean Fuels funding for \$1.5 billion in projects, and managed numerous projects to develop, demonstrate and deploy various near-zero and zero emission technologies, as well as research, development, demonstration, and deployment of alternative fuel and clean fuels technologies. Over the past 32 years, South Coast AQMD has collaborated in partnership with other governmental organizations, private industry, academia, and research institutes and interested parties. Furthermore, South Coast AQMD has and is currently working on several EPA-funded projects, ranging from air monitoring programs to deployments of zero and near-zero emission vehicles.

South Coast AQMD's successful implementation of these past and on-going projects demonstrates that it is preeminently qualified to lead this deployment project. Its dedicated, experienced staff will lead and provide assistance in the following South Coast AQMD efforts: defining the project scope, statements of work, timeline and payment schedule for contractors; directing and assisting administrative and legal staff on negotiating terms and conditions with contractors; executing contracts; performing project management oversight; and authorizing payment upon verification and approval of deliverables. At the request of EPA, staff can provide documentation and additional information of South Coast AQMD resources and abilities to execute this project. Contractors will be responsible for meeting program milestones and supplying all deliverables and reports. The proposed project will be implemented by South Coast AQMD Technology Advancement Office (TAO) and will employ the following approach in anticipating, responding to, and mitigating issues that may arise: 1) set reasonable deadlines; 2) set detailed

³ Emission reductions are calculated by CARB based on a 5-year equipment life for trucks and 10-year equipment life for ships at berth for projects funded in Years 1-3. For projects funded in Years 4-5, only the portion of emission reductions which are early or extra to existing CARB regulations is counted. https://ww2.arb.ca.gov/sites/default/files/2019-12/prop_1b_goods_movement_december_2019_semi_annual_report_to_dof.pdf

contingency plans for predictable delays; 3) regularly review the project schedule and deliverables; 4) establish and maintain lines of communication with all team members; and 5) use delays as opportunities to re-think decisions that led to problems, take advantage of changing circumstances, and improve project deliverables. If an unforeseen delay occurs, South Coast AQMD will work with the project team to identify multiple solutions, including updating deadlines, modifying deliverables, and retaining additional resources as needed. To track and measure the project progress, contractors will be required to submit all information required by South Coast AQMD and EPA.

Project 2: Low-Emissions School Bus Replacement Project

(1) Project Summary and Approach

(1-A) Detailed Project Summary



Proposed project is to replace up to 38 MY 2007 and older diesel school buses with equivalent-sized MY 2021 or newer zero emission battery electric school buses. The Moreno valley Unified School District has been aggressively installing the required infrastructure in anticipation of replacing their diesel buses with electric. The targeted diesel school buses are Type D used to carry students to and from school or related events on a regular basis as well as “painted National School Bus Glossy Yellow” and “identified with the word School Bus.” The proposed project meets eligibility criterion for on-road school buses contained in the EPA Request for Proposal (RFP #EPA-OAR-OAQPS-21-03).

Since 2001, the South Coast AQMD has replaced over 4,468 publicly owned school buses with near-zero and zero emissions technologies. The targeted school buses will be located in Riverside County. Riverside County has some of the highest levels of emissions for environmental justice communities in the State of California

(1-A-ii) *Weighing Technology Options for the Target Fleet and Selecting the Diesel Emission Reduction Solution(s)*

Mobile sources make up the largest portion of NO_x and PM_{2.5} emissions and have been identified as the most significant sources with adverse impact on air quality and public health, particularly in EJ communities in the SCAB. The day to day operations and activities in these communities’ results in high levels of emissions of ozone precursors, toxic air contaminants and greenhouse gases. In order to mitigate these emissions, SCAQMD strongly supports numerous pathways to accelerated deployment of zero and near-zero emission technologies. Diesel school bus replacements are one of many ways to achieve a Zero and Near-Zero Emission Technologies Roadmap.

Diesel school bus replacement has become more attractive for school districts considering voluntary measures in reducing emissions and diesel PM exposure to sensitive receptors. SCAQMD assessed two emission control strategies, with one that considers the replacement of diesel school buses with compressed natural gas or propane powered buses certified at CARB’s optional low NO_x standard of 0.02 g/bhp-hr, and the other is to replace with zero emissions battery electric buses. Typical duty cycle for school buses make battery technology an ideal candidate for the required charging cycles of battery technology. The battery technology strategy achieves significant emissions reductions and fits into SCAQMD air quality goals because it facilitates turnover of older higher emitting diesel to zero emission school buses and ensure that air quality benefits, especially localized benefits, are not further delayed.

(1-A-iii) *Description of Verified and/or Certified Technologies*

Proposed project is a replacement of up to 38 MY 2007 and older diesel buses with equivalent-sized MY 2021 or newer zero emission class D 42 passenger school buses. The replacement CARB certified school buses utilize 210 kWh of battery storage providing a range of 150 miles. Charging dwell times are 8 hours using a level 2 charger.

(1-A-iv) *Discussion of whom or what Organization will Retain Vehicle Ownership*

The existing school buses are owned by Moreno Valley Unified School District in the SCAB. Once the existing school buses have been replaced with zero emission buses, the qualified school district will obtain ownership of the replacement buses.

(1-A-v) *Vehicle Attrition Schedule and Engine/Bus Scrappage*

Upon successful completion of replacing diesel school buses with school buses powered by battery electric technology, SCAQMD will be required to destroy or render the existing buses along with the engines useless. In addition, the destruction of each replaced school bus with the engine will be confirmed by SCAQMD through photographs of destroyed engines and buses and a certificate signed and dated by an authorized scrap yard representative that a 6-inch hole was cut into the engine block and the chassis was cut through the frame/frame rails. SCAQMD will verify that each replacement battery electric bus is of the same type and in the same application as the replaced bus.

(1-B) Emissions Inventory

The proposed project with a quantity of up to 38 buses is estimated to annually reduce 0.30 tpy of PM_{2.5}, 3.675 tpy of NO_x and 1.82 tpy of CO emissions through replacement with battery electric buses. Achieving immediate and on-going improvements in air quality and public health,

particularly in communities where the residents are disproportionately impacted by the adverse effects of high levels of emissions, the proposed project will allow an increased volume of replacements to eligible schools within EJ communities.

The longer-term goal of this project is to promote market acceptance, professional jobs related to manufacturing of vehicles, along with associated business management functions such as marketing, program management, and financial and supply chain management.

- (1) Emission reductions are calculated using the EPA's Diesel Emission Quantifier as shown in the attachment 2.
- (2) 25-year average life per lower emissions school bus ARB guidelines.

(1-C) Consideration of activities.

Since the creation of Clean Air Technology Initiative Program (CATI) in 2010, SCAQMD has organized several public workshops with public and private fleets, and community members. The proposed project implements several control strategies contained in the 2019 SCAQMD Air Quality Management Plan. In addition to implementing similar project in other locations, SCAQMD has adopted a series of clean fuel fleet vehicle rules to reduce mobile source emissions within the SCAQMD's regulatory authority. The fleet rules require certain public entities and special districts such as air, water, sanitation, and school districts with fifteen or more heavy-duty vehicles to acquire CARB-certified alternative-fueled heavy-duty vehicles when adding new vehicles or forming a new fleet. Particularly zero emissions vehicles which are now readily available for implementation. Natural gas powered near-zero emissions school buses have been the primary replacement choice for many school districts in the effort to reduce emissions in their respective communities. However, battery electric bus technology costs are decreasing and infrastructure capabilities have reached significant progress allowing for more cost effective emission reductions utilizing zero emissions battery electric buses in place of all other available options. Riverside County continues to have the highest emissions inventories in the South Coast Air Quality Management District and SCAQMD will continue to collaborate with the public, and stakeholders and community members through existing standing committees to identify and address air issues in the affected communities.

(1-D) Progress Towards Attainment

Proposed project will be located in the SCAB. The target school buses are located and operated in Moreno Valley Unified School in Riverside County. Moreno Valley is one of the largest populated areas in the greater Los Angeles area. Moreno Valley is one of the largest intermodal freight locations in the SCAB. The SCAB is the second most populous urban area in the United States and covers approximately 11,000 square miles with about 17 million residents as shown in table 2. These areas include the number one, four and five ranked top polluted areas for ozone and the number two ranked top polluted area for PM2.5. The topography and climate of Southern California combined with the growing population, increasing vehicle miles traveled, goods movement, San Pedro Bay Ports activities, and manufacturing, chemical, and refining industries make the Basin an area of high air pollution. The close proximity of people to these high pollution areas has created a number of environmental justice areas throughout the Basin. Despite the last two decades of aggressive efforts to reduce air pollution, the Basin still has some of the worst air quality in the U.S. based on the number of days the NAAQS for ozone and PM2.5 are exceeded.

The proposed project targets the replacement of MY 2007 and older diesel school buses in disadvantaged communities or environmental justice areas with zero emissions buses. The successful implementation of the Lower-Emission School Bus Replacement Program will provide less polluting and safer transportation for school children and reduce public exposure to toxic diesel PM emissions. In addition, it would reduce air pollution in low-income, high-diesel and high-PM10 exposure areas as well as enhance the objectives of the Environmental Justice and Children's Health Initiatives.

Table 1: Project Location Demographics

County	State	% of Time Vehicles Spend in Area	Non-Attainment Area	Air Toxic Assessment Area	Goods Movement
Riverside	California	100	X	X	EJ Community

1-E) Roles and Responsibilities

The SCAQMD staff will implement the proposed incentive program, monitor progress and submit quarterly reports to EPA on progress and findings of this project. Quarterly reports will contain accomplishments, description of any slippages and challenges, and other pertinent information. The SCAQMD will also submit to EPA a final performance report, within 30 days following the expiration of the grant project period. The report shall be submitted to the EPA Project Officer and may be submitted electronically. The report shall contain the same information as in the quarterly reports, but will cover the entire project period. SCAQMD will work with Moreno Valley school district to ensure the oldest buses are replaced accordingly. Upon approval by the SCAQMD Board, Moreno Valley School district will receive a contract award to replace MY 2007 and older buses and the old buses are to be destroyed by a licensed dismantler to ensure permanent and enforceable emissions reductions.

Moreno Valley has been upgrading their electric grid over the last few years with different grant projects, they have an upgraded Transformer and Solar Panels as well as a footprint for installing the 38 chargers on an existing K-Rail. Chargers will be supplied by the School district.

(2) Environmental Justice

2-A) Environmental Justice Issues and Environmental Health Disparities

The proposed project will invest in transportation, environmental protection, and sustainable economic development in Southern California. As an example, the SCAQMD has been working with local bus manufacturers to ensure that there is a local presence in addressing questions and performance problems. Battery technology has gained significant support from school districts with current incentive demands being substantially oversubscribed. With a successful battery electric school bus program, there will be a need for additional personnel to train and maintain the battery electric bus and associated infrastructure technology. The proposed project may lead to additional implementation of zero emissions technologies in Southern California. State and federal cost sharing for the proposed projects will also assist production and distribution activities that will strongly contribute to the employment of American workers. This increased interest and demand will drive technological advances and investments that can help spread benefits well beyond the targeted areas, throughout the nation. With the increased sale of alternative powered vehicles, upgrades to infrastructure and the health impacts and costs associated will have significant economic impact. The report below shows Moreno Valley in the above 80 percentile for Ozone and particulate matter. Significant health considerations are being addressed with this proposal. Reducing emissions from older diesel school buses to zero in areas near schools is a critical targeted location affecting the most vulnerable population.

EJSCREEN Report (Version 2020)
1 mile Ring Centered at 33.916868,-117.261200
CALIFORNIA, EPA Region 9
Approximate Population: 15,220
Input Area (sq. miles): 3.14

Selected Variables	Percentile in State	Percentile in EPA Region	Percentile in USA
EJ Indexes			
EJ Index for Particulate Matter (PM 2.5)	86	88	96
EJ Index for Ozone	92	93	98
EJ Index for NATA* Diesel PM	84	85	91
EJ Index for NATA* Air Toxics Cancer Risk	85	86	93
EJ Index for NATA* Respiratory Hazard Index	83	84	93
EJ Index for Traffic Proximity and Volume	59	65	85
EJ Index for Lead Paint Indicator	63	68	81
EJ Index for Superfund Proximity	97	97	98
EJ Index for RMP Proximity	88	89	95
EJ Index for Hazardous Waste Proximity	74	78	92
EJ Index for Wastewater Discharge Indicator	N/A	N/A	N/A

EJ Index for the Selected Area Compared to All People's Blockgroups in the State/Region/USEJ IndexesPM 2.5OzoneNATA Diesel PMNATA Cancer RiskNATA Respiratory HITraffic

(2-B) Community Engagement

The South Coast AQMD has been conducting extensive community-based efforts that focus on improving air quality and public health in environmental justice (EJ) communities. Since Assembly Bill (AB) 617 was signed into California law in July 2017, the South Coast AQMD has been hosting a series of meetings seeking input on prioritizing communities in our region for future air monitoring and emission reduction programs. Diesel trucks emit toxic air contaminants that cause cancer, birth-defects, and other serious harm. Controlling emissions from on-road heavy-duty diesel trucks and encouraging an accelerated fleet turnover of this conventional technology to cleaner alternatives such as ultra-low NOx natural gas, or the emerging on-road battery-electric trucks and tractors would result in immediate emission reductions. The zero emissions school bus projects implemented by South Coast AQMD have successfully reduced emissions in EJ school communities to near zero from school buses. A Targeted Air Shed Grant in 2017 successfully removed 79 buses from EJ communities. The community engagement in these past successful programs has encourages Schools such as Moreno valley to budget infrastructure and implement a pathway forward towards electric school bus technologies. EJ communities in surrounding precincts will benefit from South Coast AQMD community outreach events displaying successful projects such as the proposed Moreno Valley school bus replacement project.

(3) Environmental Results – Outputs, Outcomes and Performance Measures

(3-A & B) Expected Project Outputs and Outcomes

The proposed project will replace approximately 38 MY 2007 and older diesel buses operating within Moreno Valley in the South Coast Air Basin. The new battery electric buses support the demanding duty cycle requirements by the schools. The replaced buses will be destroyed by

a licensed dismantler to ensure permanent and enforceable reductions. As shown in Table 3, this project is expected to result in total reductions of 100% PM_{2.5} and 100% NO_x compared to the diesel equivalent per year and over the typical school bus life.

Anticipated	Outputs and Outcomes
Outputs	Outcomes ⁽¹⁾
<ul style="list-style-type: none"> Replace 38 MY 2007 and older diesel school buses with Zero emissions battery electric school buses 	<p>Short-term: (1 year)</p> <ul style="list-style-type: none"> Reduce more than 0.3 tons of PM_{2.5}, 3.865 tons of NO_x, and 1.823 tons of CO emissions, annually. <p>Long-term: 25 yrs.</p> <ul style="list-style-type: none"> Lifetime reductions of 7.5374 tons of PM_{2.5}, 91.866 tons of NO_x, and 45.575 tons of CO emissions. Decrease public health risk to residents in heavily populated areas Accelerate market acceptance and deployment of zero emissions electric buses.

*Emission reductions are calculated using the EPA's Diesel Emission Quantifier

The longer-term goal of this project is to promote market acceptance of battery electric school buses. Successful integration of these vehicles will help thousands of children to commute in some of the cleanest school buses in the country.

On a quarterly basis, SCAQMD will report to EPA the project status, including milestones such as number of buses delivered and any challenges and delays encountered, updated timeline, if necessary, funds expended, and other pertinent information.

(3-C) Performance Measures and Plan

To track and measure the project progress, SCAQMD will, in addition to its administrative duties, inspect and record the serial numbers, VINs, horsepower, odometer readings, make, model, and year of the buses, to be replaced and confirm through photographs of destroyed engine and trucks and a certificate signed and dated by an authorized scrap yard representatives that a 6-inch hole was cut into the engine block. In addition, SCAQMD will require participating school bus operators to submit the following information:

- Two stapled copies of a quarterly progress report in the first year of the contract, or until all zero-emission school buses are placed into regular operating service whichever is later. The quarterly reports will be due by the 15th day of each month following the reporting period and shall include:
 - SCAQMD contract number and title of project
 - Reporting time period (months, year)
 - Description of work completed during the reporting period, including a discussion of problems encountered and how those problems were resolved; and other relevant activities including accumulated hours, mileage, number of zero emission buses in service during the reporting period, and discussion of bus and engine technology performance, including operational performance and repairs and maintenance performed.
- Two stapled copies of an annual report for the term of the contract. The annual report shall include, but may not be limited to, the following:
 - Information required under quarterly progress reports
 - Color photographs in a digital format of the low NO_x emission buses funded under this contract
 - Discussion of significant problems encountered during the year and how they were resolved

(3-D) Timeline and Milestones

Estimated Timeline Overview for Each Task: A detailed project plan is divided into four major tasks as outlined below in Table 1

Table 1: Project and Technical Timeline and Technical Milestone

Milestone	2021				2022				2023			
	M	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Task 1: Grant Agreement & Outreach												
1.1 EPA Award Notification												
1.2 notify schools to proceed on setting chargers												
Task 2: Contracts Execution												
2.1 Board Approval												
2.2 Contract Execution												
Task 3: Manufacture of buses												
3.1 Order buses												
3.2 Delivery of buses												

under the Clean Fuels Program established in 1988, the SCAQMD has successfully funded and managed numerous projects to develop, demonstrate and deploy various near-zero and zero emissions technologies. For example, during 2019, SCAQMD executed 68 new projects or studies and modified 4 continuing projects toward research, development, demonstration, and deployment of alternative fuel and clean fuels technologies. The SCAQMD contributed more than \$11.9 million in partnership with other governmental organizations, private industry, academia, and research institutes and interested parties, with a total project cost of more than \$134 million. Furthermore, the SCAQMD has implemented or currently working on several EPA-funded projects, ranging from air monitoring programs to replacement of heavy-duty trucks and buses with zero and near-zero emission vehicles as further described in Section (c) Programmatic Capability and Past Performance.

SCAQMD has the resources necessary to meet the goals of the proposed project. As stated previously, SCAQMD will administer project funds and provide comprehensive project management including managing EPA grants, preparing and managing a contract with the fleets, and monitoring the progress of the proposed project. The proposed project will be supported by a Planning & Rules Manager, a Program Supervisor, a Financial Analyst, an Air Quality Specialist, a Staff Assistant, and a Deputy District Counsel. Mr. Joseph Lopat is the Program Supervisor who will manage the proposed project. He has managed several DERA funded projects from School bus replacement to heavy-duty class 8 truck replacements and switcher locomotives. He has also managed R&D projects involving heavy-duty engines to battery electric locomotives, and natural gas advanced technologies for on-road transportation sources, incentive programs, clean alternative fuel technologies, and retrofit programs. An air quality specialist (AQS) will be assigned whose duties will include managing the project under the supervision of the Program Supervisor. The AQS will typically have over 5 years of research experience in battery and associated technologies. A minimum related B.S. degree or higher in a technology field associated with air quality improvement. A Staff Assistant will be selected from a team of Staff Assistants to assist the Air Quality Specialist in managing the contract with the fleets. The Staff Assistant has managed administrative aspects of RDD&D and incentive programs. The Deputy District Counsel will provide legal guidance to the staff throughout the planning and implementation phase of the proposed project.

5) Budget

Proposed project budget involves Project 1. Long Range Class 8 Fuel Cell Truck Demonstration and Project 2. Low-Emissions School Bus Replacement Project. Total project cost estimate of \$7,279,133 for project 1 includes the lease of five(5) fuel cell trucks, R&D cost for vehicle development, hydrogen fuel and maintenance cost for 1 year demonstration.

Total project cost estimate of \$12,952,162 for project 2 includes replacement of MY 2007 and older diesel school buses in SCAB with MY 2021 and newer battery electric school buses. The total project cost for both project 1 and project 2 is estimated to be \$20,231,295, of which SCAQMD is requesting \$7,998,024 from EPA, including administrative costs of \$216,024 necessary for SCAQMD to implement the project. The budget summary is shown in Table below.

Budget Summary

Line Item and Itemized Cost	EPA Funding	Voluntary Cost share	Other Leveraged Funds	Total Project Cost
Personnel				
(1) Planning & Rules Mgr (Annual Salary-\$75.27/hr; 100 Hours)	\$7,527			\$7,527
(2) Program Supervisor (Annual Salary-\$61.52/hr; 226 Hours)	\$27,807	-		\$27,807
(2) AQ Specialist (Annual Salary-\$49.25/hr; 245 Hours)	\$24,133	-		\$24,133
(2) Contract Assistant (Annual Salary-\$26.87/hr; 244 Hours)	\$13,113	-		\$13,113
TOTAL PERSONNEL	\$72,579	-		\$72,579
Fringe Benefits – 64.03% of Salaries. Includes Retirement, Health Benefits, FICA & SUI	\$46,472	-		\$46,472
TOTAL OTHER				
Subgrant to School Districts for 38 buses @ \$102,421 per bus* plus \$390,000 for infrastructure	\$4,282,000			\$4,282,000
School Cost Share HVIP \$4,462,500, School \$4,099,650		\$8,562,150		\$8,562,150
Subgrant to HMC for 5 fuel cell trucks **@ \$700,000 per truck	\$3,500,000			\$3,500,000
FirstElement Voluntary cost share for leasing fuel cell trucks @ \$93,757 per truck		\$468,785		\$468,785
HMC & FirstElement Fuel leverage cost share (in-kind)			\$3,202,336	\$3,202,336
Indirect Charges (81.454% applied to Salaries & Employee Benefits)	\$96,972			\$96,972
Total Project Cost	\$7,998,024	\$9,030,935	\$3,202,336	\$20,231,295

* \$327,741per bus

** Fuel cell truck cost: \$793,757